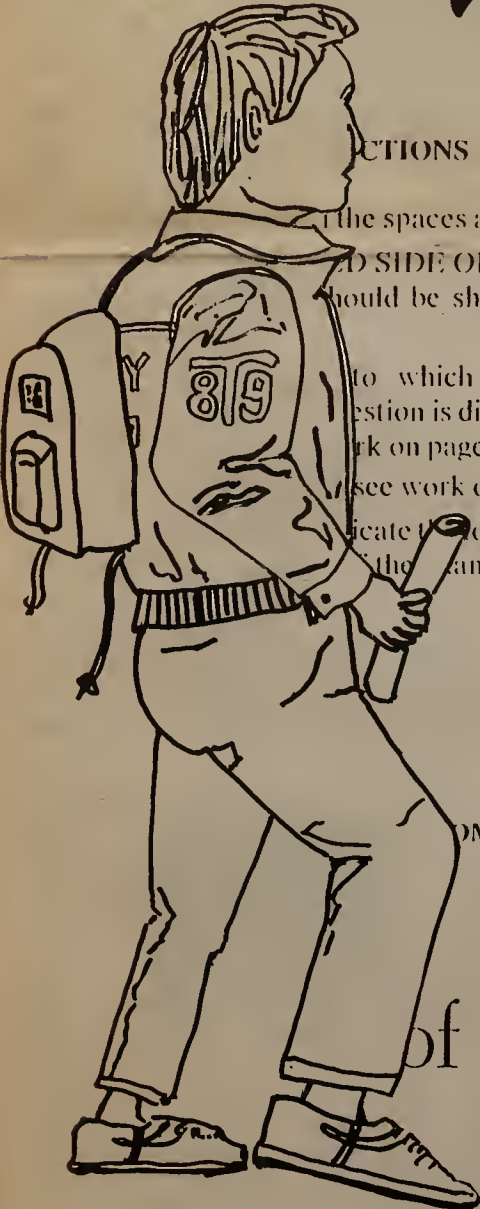


THE CANNON

FINAL
ISSUE!

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EXAMINER'S REPORT

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OM THE EXAMINATION ROOM

of Toronto

The Cannon

The Official Newspaper of
Engineering Society

Editor

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Many thanks to

Alex Rocha

Karen Carneiro

Andrew Ip

Colin Smith

Published by

Weller Publishing

Skule™ is a registered trademark of the University of Toronto Engineering Society. The Cannon is a publication of the University of Toronto Engineering Society. It is published monthly to announce Engineering Society events, discuss faculty and university matters, and to present current and technical information of interest to engineering undergraduates.

The Cannon encourages submissions. Please type or print legibly. Comments in the form of letters on the Cannon or on articles appearing therein are appreciated. The editors will make every effort to publish the submission in full, but reserve the right to edit for brevity. The opinions presented herein are not necessarily those of the Cannon or Engineering Society.

Anyone interested in helping with the Cannon is most welcome. We are located in the Engineering Communications office, room B670, Sandford Fleming Building, University of Toronto, 10 King's College Road, Toronto, Ontario.

Editor's message: hopes for next year

As the new incoming editor for next year, I feel it would be a good idea to put a word in: first of all just to show that I'm actually alive and have a voice, second to give you an idea of how I see this mish-mash of paper called the Cannon and my aspirations for next year.

I really do hope that engineering students will come to a point where they can actually take pride in the paper—call it their own—whether they be contributors or readers. In other words, I would like to see an enthusiasm for the paper as a publication that is distinctly "Engineering"—a publication that comes up with articles that are relevant, hard hitting, and intelligent, but maintains an approach that is casual, optimistic, and never without a sense of humour.

The Cannon is pretty well alone when it comes to "serious" publications in Engineering. It should be infor-

mative and it should cover the many things that are happening in the clubs, departments, and classrooms of the faculty. Hopefully the paper will give

amine how you can help out, in any way whatsoever. All it takes is an open mind and a desire to be part of a good thing. To not have people in-

ing, as well as beneficial to the faculty. For example, you can write about events and goings on you find interesting, try your hand at a bit of artwork and photography, or take up some responsibility to give you a better feel for what goes on—like being a liaison to clubs or departments. The less that I as editor am doing that I should not be doing, the better.

If you have any interest whatsoever in helping out or just want to see what goes on, talk to me—visit the Engineering Communications office (in Engineering Society, where the pop machine is), phone me (at 599-5533), or leave a message in the mail slot in Eng Soc.

Meanwhile, congrats to the grads and to those coming back in the fall, have a great summer!

-R.C.



us all a better idea of how dynamic and diverse this faculty is. Yet at the same time, it should be something that we enjoy both reading and working on.

I'd like to make a personal invitation to all of you to ex-

involved in the Cannon would defeat the whole purpose for its existence. You can forget about journalistic professionalism and the stuffiness it implies. All I would like to see is people doing what they find challenging and reward-

From the Science Editor: you too can write this summer

by Kevin Linfield ENG SCI 9T1

I have constantly been asking friends and acquaintances if they would write articles for the Cannon. This is the official voice of the Engineering Society and articles based on the pure sciences and engineering should be written (and hopefully read). You would think that there must be literally thousands of topics to write about, but the most common response is, "Give me a topic and I'll write about it."

Well, summer is almost upon us and we'll all have LOTS of free time when the only thing we want to do is solve linear differential equations. Use that free time and write! The format does not matter as much as the content. Whether it be on IBM disk, Commodore disk, the Vax, or even hand written, if you can produce an article that is interesting and contains technical content, then now's your chance. And think of the resume padding you can do.

All articles become copyright property of the Cannon. Legally, you have published a paper on whatever topic you write about. Have any questions? Please feel free to leave me a message in the Cannon mailbox or type "mail linfield" on ECF. Meanwhile, feel free to choose a topic listed here, or think of your own. Why not write about your "engineering experience" that we all get over the summer? Submitted articles will be proof read in September to be published early in the fall.

General topics: add a what, when, where, how, who, and a why and then you have your summer assignment.

Aerodynamics of a Golf ball
Aircraft Industry
Alpha Particles
Apollo Missions
Astrophysics (general or specific)
Atomic Bombs
Aurora Borealis
Carbon-14 dating
Chinese Junks
Coal and Coal Mining
Comets
Construction: Famous bridges, etc.
Dodge Satellites
Earthquakes
Energy
Energy Sources
Faults and Faulting
Fire
Fission
Fjords

Four-Cycle Engines
Fusion
Gamma rays
Gem Stones/Crystals
Glaciers
Gold Mining
History of Temperature
Hot-Air Balloons
How a Camera works
Hydroelectric Power and Stations
Hydrofoils
Jet Aircraft
Kayaks
Kennedy Space Center
Landsat
Luminescence
Lunar Geology
Mercury Missions
Microelectronics
Minerals and Metals
Natural Gas
Nuclear Energy

Oil
Optics
Peat Soil
Planets (your choice of nine)
Quarks
Radar
Recycling
Rocketry
Science of the Canoe
Seismology
Skylab
Solar Energy
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Features

Nuclear power: things to think about

by Jonathan Wyman MECH 9T0

Nuclear power is a common topic of debate. People are concerned about the safety of nuclear plants, storage and disposal of nuclear waste, and the danger of nuclear war. It is important for us as engineers to be aware of the issues and the facts, so that when necessary we can help others understand the realities of nuclear power.

Industry sound

From a technological perspective, the nuclear industry is sound. Kenneth Hare, the Chancellor of Trent University, recently submitted a report to the Ontario Government based on a year long study. The major conclusion was titled Overall Safety: "Ontario Hydro reactors are being operated safely and at high standards of technical performance. No significant adverse impact has been detected in either the work-force or the public. The risk of accidents serious enough to affect the public adversely can never be zero, but is very remote."

Nuclear plants do emit small amounts of radiation; however, these amounts are negligible compared to the background radiation to which we are exposed every day. The REM is a means of measuring amounts of radiation. Canadians, on average, are exposed to 220 millirem per year from background radiation. The maximum that Ontario Hydro nuclear power stations release is 5 millirem, about the dose a person would pick up by flying across the country.

Nuclear waste

Nuclear waste can be safely stored. Theoretically, there should be no detectable leakage whatsoever from storage sites. The spent fuel that people are most concerned about is not the main problem. Most nuclear waste is a byproduct of the mining process. While it is not nearly as strong as spent fuel, there is a great deal more of it. En-



Nuclear power: a viable alternative? (MECH 9T0 class at Pickering Nuclear Generating Station)



richment plants, required by most reactors other than the CANDU also produce large amounts of low level waste. The problem of locating storage sites is now primarily a political question, comparable to location of potential landfill sites. Professor A.N. Sinclair, Chairman of the Engineering Science Nuclear and Thermal Power option has said, "Given that these things have to be somewhere, I must say I'd rather have a nuclear waste depository beside my home than a plant that's burning coal."

One of the most attractive things about nuclear power is how it stands up in comparison to the alternatives. Despite the huge capital costs of constructing nuclear plants, nuclear power appears to produce the cheapest electricity available. As well, small amounts of waste radiation seem preferable to large emissions from coal and oil fired plants. These plants produce an abundance of sulfur dioxide, which causes acid rain, and carbon dioxide, which may be contributing to global warming by means of the greenhouse effect.

Public fears

All these scientific assurances are not enough to make people comfortable with nuclear power. People are right to criticize the trend to meet rising power demands rather than reduce them. Im-

proving efficiency and encouraging conservation are more effective in the long run than continuing to invest in multi-million dollar plants. It has been predicted that we will be facing severe power shortages by the mid 1990's if construction of more nuclear plants is not begun immediately; however, extensive conservation can also prevent this predicted shortage.

The most frightening aspect of nuclear power appears to be the carelessness with which it is handled. While the Canadian government has an acceptable record, the American government does not. In the 1940's and 50's massive doses of radioactive material were deliberately released across the Pacific North-West. The releases were thousands of times more severe than the Three Mile Island release, and appear to have been part of an effort to identify locations of plutonium plants in the Soviet Union; tracking emissions in the U.S. would tell the American government what to look for.

It is very difficult to make people comfortable with nuclear power when fears and apprehensions are very real and are well based. It is our task as the engineers of the future not just to make nuclear power a safe and economical possibility, but to ensure that its use is regulated responsibly.

A world energy crisis: everyone's concern

by Steve Quan MECH 9T0

In the context of the average person's perception of the global energy situation, there currently appears to be a most unfortunate, perhaps even tragic, misconception of just how quickly the world's conventional energy sources are being exhausted.

During late 1960's, the first reports on the subject from the scientific community awakened the global community to the perils of this planet's large-scale dependence on finite supplies of fossil fuels. The impracticality of the remaining global economic infrastructure powered by oil and coal was made clear at the time and much public debate and scientific research was inaugurated into finding alternative sources of energy. The 1973 Middle East conflict and the resulting Arab oil embargo on petroleum supplies to the United States further strengthened the public support for this initiative. Clearly it was in vogue at the time to pursue the development of clean burning, renewable energy sources, such as the hydrogen and nuclear fusion options.

Misconceptions

However, in this decade it seems that the public's interest in general has waned considerably. With the level of media coverage on the omnipresent energy problem ranging from negligible to insignificant, many of us have been lulled into believing that the energy crises has ceased, or at least was not as bad as we thought it was. Indeed, with the current glut of oil on the world market, it may even seem that there is more than enough fuel available to satisfy global needs for an indefinite period.

Unfortunately, this is not the case. The best current economic projections predict that global demand for energy, which is steadily increasing, will outstrip the supply of fossil fuels early in the next century, at around the year 2005. At about the same time petroleum production will begin to level off, beginning a slow decline as the last of our planet's petroleum reserves are tapped. Natural gas sup-

plies are even more limited and may begin to show signs of depletion within as little as fifteen years. Coal is relatively plentiful worldwide, but, with the exception of low sulphur varieties such as those found in western Canada, has too many environmental risks associated with its combustion to permit its use as a long term energy source.

Public initiative

Obviously a serious problem exists here. However, without strong public support for the development of practical alternatives to the fossil fuels the government and industry support, the success of such an initiative will not likely be forthcoming. This fact is especially true in a democratic system such as we have in the Western world. Yet, as demonstrated above, public interest is at an incredibly low level, or is misdirected.

In Toronto itself this above phenomenon is quite present. As witnessed by the backlash of public opinion after the Chernobyl incident, many citizens disagree strongly with Ontario Hydro's continued operation and construction of nuclear generating stations, which provide a non-polluting, efficient and quite frankly, safe, supply of energy. Yet Toronto itself has one of the highest per capita energy consumption rates of any city on the North American continent and may well face blackouts in the 1990's as the demand for power outstrips supply.

Our role

As students of this faculty we must all assume a special concern as the global energy demand reaches a critical stage in the upcoming years. As future engineers, be it in any department, it will be our responsibility to investigate, determine, and implement the alternative energy sources that will sustain global economic development through the next century and beyond. This economic development should be of special interest in another, even more direct way. As the effects of the global energy shortage begin to manifest themselves near the turn of the century, most of us will coincidentally be in the process of starting our own continued on Page 6

Engineering Society

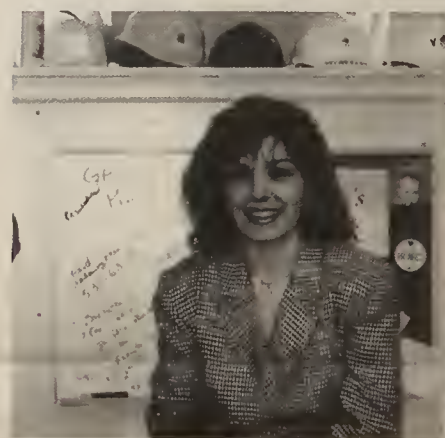
President Elected

Cosetta Caporrella

Well here goes another article for the Cannon, but this time I'm writing from the Eng Soc president's shiny new desk (drop by anytime and check it out, it was free too). I was very excited about the election results and am anxiously looking forward to serving the engineering undergraduate students to the best of my abilities this summer and in the upcoming year. I would like to take this opportunity to congratulate my opponent, Robert Drascic, for running an excellent campaign, to thank my campaign team for all their help (that means you, Louie and the Civ guys), and to especially thank my supporters for having me elected.

I have so many ideas rolling around in my head, most of which I am putting on hold until after exams, then . . . look out! To name a few, I'd like to restate from my campaign article, that I want to help in the movement to improve the image of engineers by publicizing all the good that the faculty does and by developing a positive rapport with industries, possibly in a common

charitable effort. I want to increase participation in Engineering society events by consulting with individuals to find out exactly what people want . . . I AM approachable and I'm not afraid to make changes. Come talk to me about new event ideas, gradball 9T0, the career centre, the faculty office, conferences, Eng Soc committees, the stores, and so on. Communication is extremely important and I am going



to need the help of all class representatives in maintaining this. On the administrative side, I definitely intend to continue/improve the laser printing service (take advantage of it, it's great), to have functioning 5 cent photocopiers available and to increase the product line in the Engineering Stores. Above all, I intend to represent U of T Engineering undergraduate students as enthusiastic, intelligent, professional people in my dealings with the faculty, the administration, industry, other engineering associations, campus groups, the media and the world!

Well, that sums up my Presidential promises; at the end of next year we'll look back and check how many I fulfilled.

Since I am also the out-going V.P. Activities, I'm supposed to write about that too. The most exciting part of that job was Orientation. It was fun to organize, work with the committee and rewarding to watch all the happy frosh having a good time, especially at Frosh Night. Throughout the year, I was basically helping out and on the committee chairmen's cases about getting things done like Homecoming, Blue Bowl, Oktoberfest, XmasSuds, Cannonball, Godiva Week and the new Games Night. It really was a fun job and as an executive officer I did learn all about the running of the Eng Soc. I'd like to wish Kevin Fair the best of luck in his new position and I hope he enjoys it as I did.

I will conclude by wishing everyone luck with their exams and with finding summer jobs, congratulate the graduating class of 8T9 and wish them luck in finding permanent jobs and finally wish everyone a great, safe summer!

Former President

Keren Morehead

It's Friday, March 31 and thesis is due in week . . . just a little bit of stress happening here! I don't have much time to write this message so it won't be long.

I think this year went pretty well. We had just a small amount of turbulence about the Toike—now world infamous . . . but coming out of the ordeal looking O.K..

I would like to thank all of the executive for being very helpful this year. The council was much more enthusiastic than last year, so things are looking up. Hopefully, next year will be even better!

I would especially like to thank the officers, Pete, Francis, Rob and Cosy for doing a good job this year. It's nice when everybody carries their own weight (have another donut)! Anyways—I wish next year's council the best of luck—it's all yours.

P.S. Cosy - say hi to Apollo for me . . .

Vice-President External Elected

Andrew Wyllie

This year I have the distinct pleasure of representing engineers and the Engineering Society as the vice president in charge of external affairs. This basically means that any communication between the engineering society and the outside world will pass more or less over my desk.

The position of V.P. External is relatively new. It was created to give the president more time to execute his or her tasks and to deal with any matters pertaining to society communications. The committees which fall directly under V.P. External include:

Communications—deals with all Eng Soc publications

Employment—sets up job seminars, job fairs, etc.

High School Liaison—gets engineering students to visit their old high schools

Professional Development—to broaden our knowledge of the engineering profession

As well as the committees, for next year I am planning on proposing a new publication which will inform people in and outside of engineering about the different types of projects and research being undertaken in the faculty. There are three conferences coming up this year. These include:

APEO—in Waterloo, which talks about the engineering profession

RESSA—at McMaster, where engineering students from Quebec and Ontario get together and discuss matters dealt with by engineering societies

CCES—at Queens', similar to RESSA, but has students from all over Canada take part

Anyway, I'd like to thank you for electing me as V.P. External. If you would like to know more about the stuff above, come by the Eng Soc and talk to me, I'm usually around at lunch. Thanks.



Do you know these people?

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in the CANNON

ENGINEERING SOCIETY LEVY SUMMARY 1988-89 (What was done with the \$100.00 you paid!)

Geological Engineering	\$1536.02
Metallurgy and Materials	\$7968.24
Civil Engineering	\$26,829.00
Mechanical Engineering	\$33,395.59
Chemical Engineering	\$30,000.00
Industrial Engineering	\$23,362.00
Electrical Engineering	\$45,087.49
Aerospace Engineering	\$4,052.33
Engineering Science	\$3,845.95
First Year Students	\$60,000.00

For much more detailed information inquire with Thomas Barnes, Engineering Society.

Executives for 1989-1990

Former Vice-President External Francis Uy

Well, looks like another fun-filled year is over. When I took on the position of VP-External last year, I didn't realize that I would also be getting a crash course in journalism. (Hey, do you want to be on TV, do you hunger to be heard on radio, desire to see your name in newspapers all over Canada? Well, if you do, then just be an Eng Soc officer during a Toike Oike scandal... it's an experience you won't forget.) Fortunately, however, the Toike has risen like a phoenix, and is once again the quality satire publication it was destined to be.

As of this writing, the Decanal Task Force on Engineering Society and Faculty Issues (on which I represent Eng Soc) is finishing a report that will provide the Dean with recommendations regarding problems with non-academic behaviour of engineering students and the general stature of the Faculty and its students.

Included in the report will be a Code for Non-Academic Behaviour. This is aimed at sending the message that inappropriate student activities will result in disciplinary proceedings. Hopefully, the damaging engineering stereotypes that exist because of the inconsiderate actions of a few are limited.

It was also determined during our meetings that there is a need for a person within the Engineering Society to coordinate all of the information about engineering events within the Society as well as within the Faculty. More often than not, the media tend to concentrate on the scandals and fiascos, and disregard and/or overlook the good that we do. Therefore, it has been decided that future VP Externals will be responsible for the dissemination of such information.

In closing, I would like to extend my sincerest gratitude to all those who helped make this year memorable (you know who you are). Congratulations to Andrew Wyllie, who's next year's VP External (and the rest of the executive, of course). Good luck in your future endeavours.

Vice-President Finance Acclaimed Thomas Barnes



Hi! I'm the Vice-President Finance for the Engineering Society for the year 1989-90. I'll be in Third Year Engineering Science (Chemical Option, what's more) next year, assuming I survive exams. At the moment I'm really busy trying to work out what I'm supposed to be doing, so if you need anything find me in the Eng Soc (SF B670).

P.S. Remember: No matter where you go, there you are.

Former Vice-President Finance Rob Drascic

This past year has been quite a busy one for the V.P. Finance, starting last March with a search of the roof of the office for my files to the last minute rush this March to tie up loose ends.

The first major hurdle that I had to overcome was showing up for work one day in August to find one of my co-workers smugly waiting to inform me that our secretary had quit. Job advertisements had to be quickly placed and I must say that the response was less than overwhelming. Then I received a call from a Ms. Julie Wilkinson. As everyone had summer jobs, I had to ask her to come in on a Saturday for an interview. The office was a total mess due to renovations that were going on, and I had to search for a clean chair for her to sit on. Nevertheless all turned out well, as Julie quickly accepted the job offer to become our new administrative assistant.

Next came Orientation with its overwhelming amount of cash to deal with. Counting over \$17,000.00 in cash quickly teaches you how to deal with the measly sums brought in by all the other events.

Trying to figure out a fall budget was quite an experience. Trying to keep everybody (no names) under budget was even worse.

This year I decided to take the money that we receive from locker sales and actually purchase new lockers. This is the intent of the money but it hasn't happened in years. After weeks of haggling with companies, 80 new lockers were purchased and placed in the Roseburgh building.

In January I attended the CCES conference in Halifax. I learned a lot of new things and had a great time in the process (see picture of Jon Andrew Wyllie in the February Cannon).

The Spring budget also brought about the creation of Club Aid. This is a new item in which the different clubs can purchase equipment for their common rooms and the Eng Soc will reimburse them half of their purchase price up to \$300.00.

The title V.P. Finance is a bit misleading in that it makes you think that only money is being dealt with. This is not true in the least as the responsibility of the day to day running of the Society rests on the shoulders of the V.P. Finance (good luck Thomas).

All in all it's been a pretty good year with a few problems but mostly lots of fun (i.e. Christmas party). I enjoyed the experience and wish next years council lots of luck. (They'll need it!!)

Vice-President Activities Acclaimed Kevin Fair

While sitting here this evening trying to figure out what I should write, I hear on the radio that faculty and students from Ontario universities are making efforts to reduce binges of excessive drinking on campus. This "problem" is especially apparent in high pressure programs like engineering where students have been said to drink more than 10 beers per week on a regular basis. These students apparently like to party like crazy on weekends to relieve the stress created by all the hard work during the week. Well folks, the only problem I see here is that somebody is 'making efforts' to damage the high level of spirit in these high pressure program like engineering.

Next year, along with the Social and Blue & Gold Chairmen, I will be planning a lot of events, both old and new, that will hopefully appeal to all engineers, both those who like to "demolish forty beers" and those who just like to party. The engineering pubs, "The Last Bash Before the Crash" in the fall and "The Rites of Spring Pub," which were cancelled this year, will be brought back for next year whether other people think engineers should stop drinking or not. There will also be more effort next year to get other professional faculties involved in engineering events and to get them to involve us in theirs. One such event is Orientation where hopefully there will be a lot of opportunities for engineering frosh (and Orientation Committee members) to meet students from other faculties, ie Nursing and Rehab Meds.

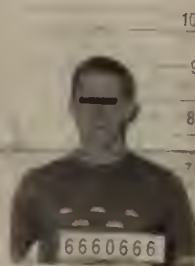
The Orientation Committee held it's first meeting on Wednesday March 29 and has begun to plan next years Frosh Week with the help of recommendations of the Orientation Review Committee. This review committee discussed last years orientation and has proposed changes to next year's. The next meeting of the Orientation Committee will be held on Wednesday May 3 at 7:00 pm in GB 202. If you couldn't come to the first meeting but would still like to be on the committee please pick up a sign up form from Julie in Eng Soc and return it filled out to the V.P. Activities mailbox.

Former Vice-President Activities Cosy Capporella

Secretary Elected Robin Wilson

Former Secretary Peter Noble

Congratulations to all



Shinerama: What it's all about

by Arthur Sit

\$5 million. Now that I have your attention, you're probably wondering what Shinerama is all about. Let's start at the beginning. Back in the mist shrouded depths of time (1964), groups of frosh were taken out on the streets and made to shine shoes to raise money for Cystic Fibrosis. Who would have ever thought that the frosh as well as the upperclassmen would actually have fun doing this! Well, since then, Shinerama has grown to be the single largest charity event among Canadian post-secondary schools. Today, there are approximately 60 universities and colleges which participate in this nation-wide event, with over 15,000 students involved.

The money raised from Shinerama goes directly to Cystic Fibrosis (CF) research. CF is a genetic disease that affects the lungs and diges-

tive system, and is the second largest killer of children in Canada next to cancer. About 1 in 20 people carry the CF gene, and if two people carrying the gene have children, there is a 1 in 4 chance that the child will be born with Cystic Fibrosis.

The University of Toronto has been involved in Shinerama since 1969, at which time only Nursing and Engineering participated. However, over the past six years it has grown to include almost all colleges and faculties at U of T. Last year, U of T raised \$34,343 with Engineering raising the most of any college or faculty (naturally).

The Shinerama Committee for 1989 has already begun plans for the next Shinerama. As well as the usual shoe shining, hot dog eating, bed race, and pub/comedy night, there are also events throughout the summer in which committee members participate. If you are interested in becoming involved please leave a message in the Shinerama mailbox in Engineering Society.

Last year U of T finished third in Canada, behind Western and (groan) Waterloo. This is not the natural order of things. This can be changed if we have a good committee with good ideas. Let's send a personal challenge to these universities and show them once and for all that Skule and U of T are number one!

By the way, in case you're still wondering, the \$5 million is how much has been raised by Shinerama since its inception.



Agree? Disagree?

Write about it! in the Cannon

Energy future dim

continued from Page 3

families. What we do, or do not do, will unquestionably affect the kind of world our own children will inherit.

Without adequate supplies of power, our society will not be able to produce the commodities, foodstuffs, and services necessary to maintain civilization as we know it presently. A general breakdown of social order, drastically lower living standards, and a steady increase in international strife as nations inevitably seek to safeguard their own energy sources at their neighbours' expense will be some of the results from this scenario. Hopefully, it will become every engineer's conviction to support the development of sustainable energy sources so that we may be assured of a smooth global transition from a fossil fuel based economy to one based on nuclear fission, hydrogen, and eventually, fusion power sources.

Big Red finally finished

Engineers give presentation on new Scotia Plaza Tower

It's taken four and a half years, but that big dark red thing, the Scotia Plaza Tower, has finally been erected.

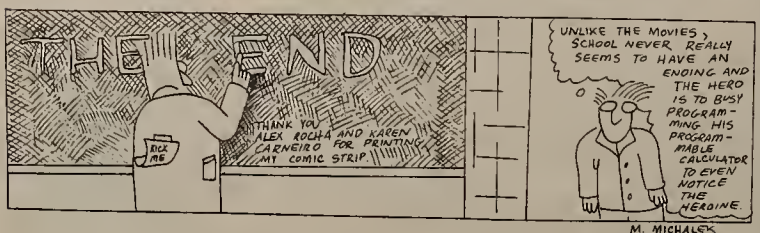
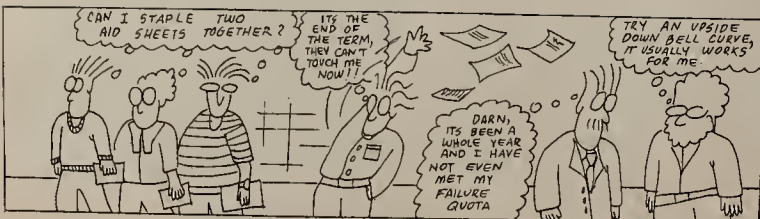
Back in the fall of 1984 the foundation excavation began and in the next few weeks the subcontractors working inside will be completing their work on the top floors.

Last Thursday evening, the CSCE (Canadian Society for Civil Engineering) Structural Section invited two gentlemen, who were actively involved with the planning and construction, to present highlights of the project. Complementary coffee and donuts were engulfed by all who attended. Among the topics discussed that evening were design considerations, materials choices, special construction equipment, project management, and construction problems.

A "concrete core, steel tube" choice was made for the overall structural design. Following this, the numerical analysis problem for the tower's structure was solved on a 1984 state of the art computer—it took 36 hours to solve each time it was run (pretty fast eh?) With regard to materials, a special concrete mix was supplied to provide the necessary 70 MPa - 90 day strength (almost as solid as a "Fresh" Versa donut) for the foundations and bottom 5 floors. Hauling all of the fresh concrete around the site was accomplished by a network of pumps in the early stages, however as time went on the



UNPARALLEL THINKING



pumps became clogged on higher floors and the two custom built cranes took over this job. Throughout the construction period the numerous sub-contractors were kept busy. Because of very efficient financing and management techniques the Construction Manager had tenants occupying the first few floors while the top floors were still being constructed. This saved the firm time and ultimately, money. Even now, work continues while new tenants are moving in. However, the project did have setbacks. There was the elevator-lift incident last year in which a construction elevator went out of control. Though not addressed by the speakers last Thursday, the incident was fatal. On a lighter note, shoring (support of the dirt so it didn't cave in on the foundation excavation) posed a problem, because a neighbouring building (Royal Bank) has a bank vault in the foundations. The soil engineers has to allow very little movement of the earth which supported the neighbouring building's foundations. Luckily, they were still employed after a job well done.

The presentation was informative for the mind and fulfilling for the stomach. So long as the CSCE provides real fresh donuts and real fresh coffee, I would definitely listen to a couple of engineers talk about the erection of the new guy on the block—big red.

The Redox Chemiluminescence Detector

Detecting "undetectables" in chemical mixtures

by Kevin Linfield ENG SCI 9T1

(Thanks to C. Lovell)

Recently, a device has been devised that, in conjunction with gas chromatography, allows scientists to detect and quantify components such as sulphur compounds in the presence of higher concentrations of less significant compounds that make up the matrix. Previously "undetectables" can now be sensed by using a "Redox Chemiluminescence Detector," also known as RCD. It is based on redox reactions, which is to say, a compound undergoes an oxidation-reduction reaction. These reactions are exogenic and while the majority are exothermic, the RCD involves the emittance of photons of light. Simply put, oxidation involves the gaining of electrons, and reduction the loss of electrons.

After separation of the constituents via chromatography, a reactant is mixed with the effluent and the reaction which occurs produces a more readily detectable compound.

The RCD is fortunately not

sensitive to the major constituents in the composition of many samples, such as alkenes, chlorinated hydrocarbons, water, nitrogen, and oxygen. The luminescent reaction involves the catalyzed post-column reduction of NO₂ and the oxidation of the formed

mixing of NO₂ with the analyte continuously in a post-column gold catalyst bed. NO is formed when the analyte present rapidly reduces the NO₂ and the RCD responds to compounds that serve as reducing agents (example: alcohols, aldehydes, olefins, and carboxylic acids).

which have been coated with a micro-thin layer of pure gold being heated between 150°C to 400°C. The area of the gold bed is 10mm by 2mm.

f) Ozone is added into the reaction chamber with the NO/NO₂/effluent.

g) The chemiluminescence

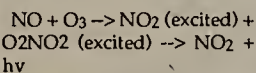
olefins, aromatic hydrocarbons, amines, and phosphonates. Compounds that are detectable by the RCD and not detectable by the FID are ammonia, hydrogen sulphide, carbon disulfide, formic acid, and formaldehyde.

There are many advantages of using this new detector over the FID. The RCD does not need massive sample preparation or fractionation and provides a wide range of applications in the laboratory, as well in the field.

(Note: The Molar Response Factor (MRF) is equal to the RCD response per mole of analyte divided by the RCD response per mole of 1-hexanol.)

SCIENCE

nitric oxide via the reaction with ozone. The nitrogen is being oxidized from an oxidation state of +2 to an o.s. of +4:



The excited NO₂ relaxes to a ground state by photo-emission in the visible and infrared region of the spectrum. The intensity of emission is proportional to the [NO] and is detected by a very sensitive photoreceptor/multiplier. The levels of NO that can be detected are greater than 0.01 ppb (parts per billion).

The RCD involves the

The apparatus is as follows:

a) The sample undergoes gas chromatography and is separated into its various components.

b) Helium, purified to 99.9% is introduced as the inert carrier of NO₂. (The sensitivity of the reaction varies directly with the purity of the sample.)

c) NO₂ is mixed with the carrier at a typical concentration of 100 ppm.

d) A Pyrex glass tee sweeps the effluent of the chromatography into the redox reaction area with the NO₂.

e) Gold catalyst zone for the redox reaction. This area consists of a bed of 230-325 mesh borosilicate glass spheres

reaction chamber, which is just a modified commercial NO/NO_x chemiluminescence detector.

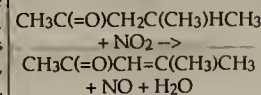
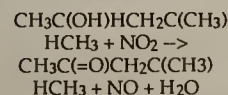
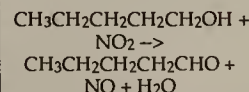
h) Photomultiplier tube and electronics.

i) vacuum pump

Tests were done with the Flame Ionization Detector (FID) as well as the RCD for simultaneous results.

Specific examples of this reaction are listed to the right.

The RCD response depends on the ability of a compound to serve as a reducing agent rather than that of the presence of a specific element. Detectable compound classes include alcohols, aldehydes, ketones, acids, phenols,



Late- Thesersers in SF

Q: What advice would you give to all undergrads at the Faculty of Engineering and Applied Science?

Teresa (top): Do you thesis in the summer!

Andrew (bottom): Let's not do a thesis and just say we did.!



Super Flash

U of T student takes entrepreneurial category

by Alex Ochrym CIV 9T0

Palms sweating and Windsor knots not knotting, Cosimo Casale and Mark Noworolski nonetheless awoke on the morning of March 4 confident of their destiny. And why this blatant confidence? Because they were certain that an entire year of planning, patience and steely determination would pay off. However, this time they were playing for keeps.

After all, this was the tenth anniversary of the Ontario Engineering Design Competition, a milestone in engineering excellence. The contest, open to all undergraduate engineering students in the province, was the culmination of an engineering education but applied to the real problems of the real world.

Of all four categories of the competition, Entrepreneurial Design is the most demanding as students are challenged to design a marketable product currently not available in Canada. It is also judged with the finest toothed comb, this year under the

watchful eye of Miro Forest, president of Northern Telecom. In this category, Cosimo and Mark quickly learned that they were playing with the big boys.

Having enlisted the help of Noworolski, the two set about researching the market and to their surprise they found there was potential for their idea. Most photographers were looking for a 2400 watt/second pack to deliver power to their bulbs. Furthermore, they expressed interest in a programmable pack. These two aspects were to become the corner stones of the "Super Flash."

After several months at the drawing board, their prototype, which they had decided to enter in the prestigious OEDC competition, was finally taking shape. The programmability of their model permitted them to make the circuitry simple. This in turn cut costs and

development time. In short they had a winner on their hands.

Their project complete, their presentation polished, they set off for Queens' with their eyes on glory. The competition was equally prepared and the judges were well rehearsed in all the aspects of electronics. Having been grilled by trick questions the entirety of the morning, the two anxiously awaited the awards banquet that evening.

At their table sat a wide variety of people, from the Dean of Engineering at Western to various captains of industry, making for enlightening conversation as they prepared themselves for the results of the competition. True to form Mr. Casale and Mr. Noworolski emerged victorious thus reaffirming our faith in the university, engineering and capitalism. Do not be alarmed if your graduation portrait is taken with a "Super Flash (TM)." You heard it here first.



Their entry—simple yet at the same time technically complex. As an employee of Polytronics Engineering one summer, Cosimo was approached by his employer to investigate the possibility of designing a special power pack for studio photography.

Concrete contest a success

by Colin Smith CIV 9T0

"Let's make a deal!" That was the theme of the 2nd Annual University of Toronto Concrete Mix Competition. Professor (and former Brad Leedur) "Monty" Hooton served as "Deal Master" and choreographer (music included the Olympic theme and the Monty Python players). The object of the contest, organized by the U of T section of the Canadian Society for Civil Engineering, was to design and build the strongest beam. The prize for winning this category was

ants became visibly nervous. The first graduate team entry to be tested was that of the structures grads. It failed outside of the middle third, and therefore was ruled ineligible. The materials grads started to worry. They had chosen a similar shape for their section. Their fears turned out to be unfounded, as they came up with the highest strength of the day, 37.4 kN. The team of Igor Pashutinski, Pat McGrath, Paul Deleur and Kal Rahal won the \$50 prize, and saved the grads from the humiliation of being beaten by the undergrads. The team



CSCE 2nd Annual Concrete Contest first prize winners (from above left) James Whalen, William Nunes, with Prof. Hooton; all beam entries (below)



\$100. There was a \$50 prize for the team that came closest to guessing the actual strength of the beam (this portion of the contest was suitably entitled "The Load Is Right"). The team with the highest load to mass ratio won \$50. There was an additional \$50 prize for the graduate team that had the highest strength entry, providing it surpassed all of the undergraduate entries. If it did not the prize was to revert the undergraduate team with the highest strength entry. The prize money was donated by St. Mary's Cement.

Casting was done on Feb. 1. Each team was given a set list of materials. They could then barter with "Deal Master" Hooton for supplementary materials, based on a point system. On March 3, each entry was subjected to a modulus of rupture test. After some of the early entries failed to perform up to expectations, many of the contest-

of Darren Wint and Paul Woodworth won the \$50 "Load Is Right" prize. The team of Tom Kliem, Gord Ho, Andrew Ip and Tom Kologianis had the highest load to mass ratio (2.65).

The big prize of the contest was won by Bill Nunes and Jim Whalen. Nunes was a first prize winner in last year's floating concrete contest. In addition to the prestige and the \$100, they received an award at a dinner ceremony held by the Ontario Chapter of the American Concrete Institute. In addition, Professor Hooton gave them a tour of the new Harbourfront rapid transit system.

The contest was sponsored by the CSCE, Civil Club, A.C.I. and St. Mary's Cement. Highlights of the contest will be shown on TVO's French network sometime this fall on the program "Science en Images." It is possible that it will also be shown on the English network sometime next year.

Environment board chief discusses assessment challenges

by Andrew Ip CIV 9T1

On March 15, Michael I. Jeffery, Q.C., volunteered his time as a guest lecturer on Environmental Engineering at the University of Toronto. Jeffery is a recognized authority in administrative law and holds an LL.M. degree in environmental law from Osgoode. He governs and sits on many committees and is the Chairman of the Environmental Assessment Board.

The Environmental Assessment Board (EAB) has a broad and challenging mandate: to provide for the "protection, conservation, and wise management" of Ontario's environment. As Chairman of this government body, Jeffery is often challenged with severe and demanding environmental problems, ranging from nuclear waste management to timber management to transportation and highway regulation. Unlike other provincial or federal boards which can only hold public hearings and make recommendations, Jeffery emphasizes that the EAB is in fact a "quasi-judicial tribunal"



and is the only such committee "empowered to make decisions, to rationalize or pass a mandate."

Since his work inherently involves a variety of advanced technology, Jeffery regularly requires expert assistance—the role of the Professional Engineer. The engineers play an important role as witnesses and to provide expert testimony to "enhance the Board's understanding of the issues being presented at a hearing."

In one case, a region of Scarborough was affected with water contamination. What seemed to be a simple case of wastewater seepage eventually required expert witnesses from the fields of geotechnics, hydrodynamics, civil and electrical.

In another case, a new highway was proposed to ease traffic congestion for commuters between cities; the problem was that the highway involved constructing a "clover-leaf" ramp which went through an "insig-

nificant town" between Burlington and Hamilton, with a small population of elderly inhabitants. Since it was only a proposal, there was no guarantee that the highway would be built, and thus, no guarantee that the affected homes would later be expropriated. Although emotion was stronger than substance at the courts, the three member EAB approved of the highway development by majority; Jeffery, alone, voted against it. Studies of the savings in commuting time due to this highway turned out to be about five minutes in peak hours. Jeffery concluded bitterly: "To this day, the town is still in a state of limbo, with greatly depreciated property value... the highway may have been built."

These cases are not only a concern for the courts, but for all engineers: it is an obligation of an engineer not only to enhance society, but also to preserve the environment.

Galbraith structures lab to be renamed

by Neil Hutchings CIV 8T9

The Mark Huggins Laboratory (formerly known as the Galbraith Laboratory) will soon have a new sign to replace the temporary one that now hangs on the north wall. Students of the graduating class of CIV 8T9 have offered to donate both their time and money towards the construction of the sign.

The proposed design (appropriately) incorporates the signature of the late Mark W. Huggins. This creative idea for the sign was the brainstorm of staff project coordinator, Prof. H.R. Prion. The indented letters will be painted to contrast with the surrounding grey polished concrete panel. Numerous test mixes are being investigated in order to achieve the optimum combination of strength, durability and appearance. To finish the sign a maple frame will be built around the concrete panel.

The decision to utilize both concrete and wood derives from Mark Huggins personal and technical interests.

Born in Toronto in 1911, Mark Huggins went on to achieve his B.A.Sc. (1932) and M.A.Sc. (1933) degrees from the University of Toronto. After a combined career in industry and academics, Mr. Huggins returned to join the Department of Civil Engineering at the University of Toronto.

As a senior member of the Structural Engineering Staff, Professor Huggins gave generously of his time to students along with assuming a number of committee and administrative assignments. In 1945, he established the Consulting Engineering Partnership: Morrison, Hershfield, Millman and Huggins (now Morrison Hershfield Ltd.)

In addition to being a contributor to a wide assortment of papers and codes, Mark Huggins did work within various technical and professional societies.

This article does not allow the total account of his long career, but those interested may read a copy of the introduction to the Mark W. Huggins Symposium (written by Carson F. Morrison) now on display across from GB 138.

The construction of this sign is but a small attempt to honour many contributions to the students and the university.

The date set for the official unveiling is April 7, 1989. Notices are being sent out to families, members and other interested parties.

The author would like to thank the following list of staff for their contributions already to the project:

Jack Clarke
Joan Buzzio
Bill Morrison
Kim Pressnail
Doug Hooton
M.P. Collins
Renzo Basset
Ron Taumas
Brian Ferguson